Fig. 1

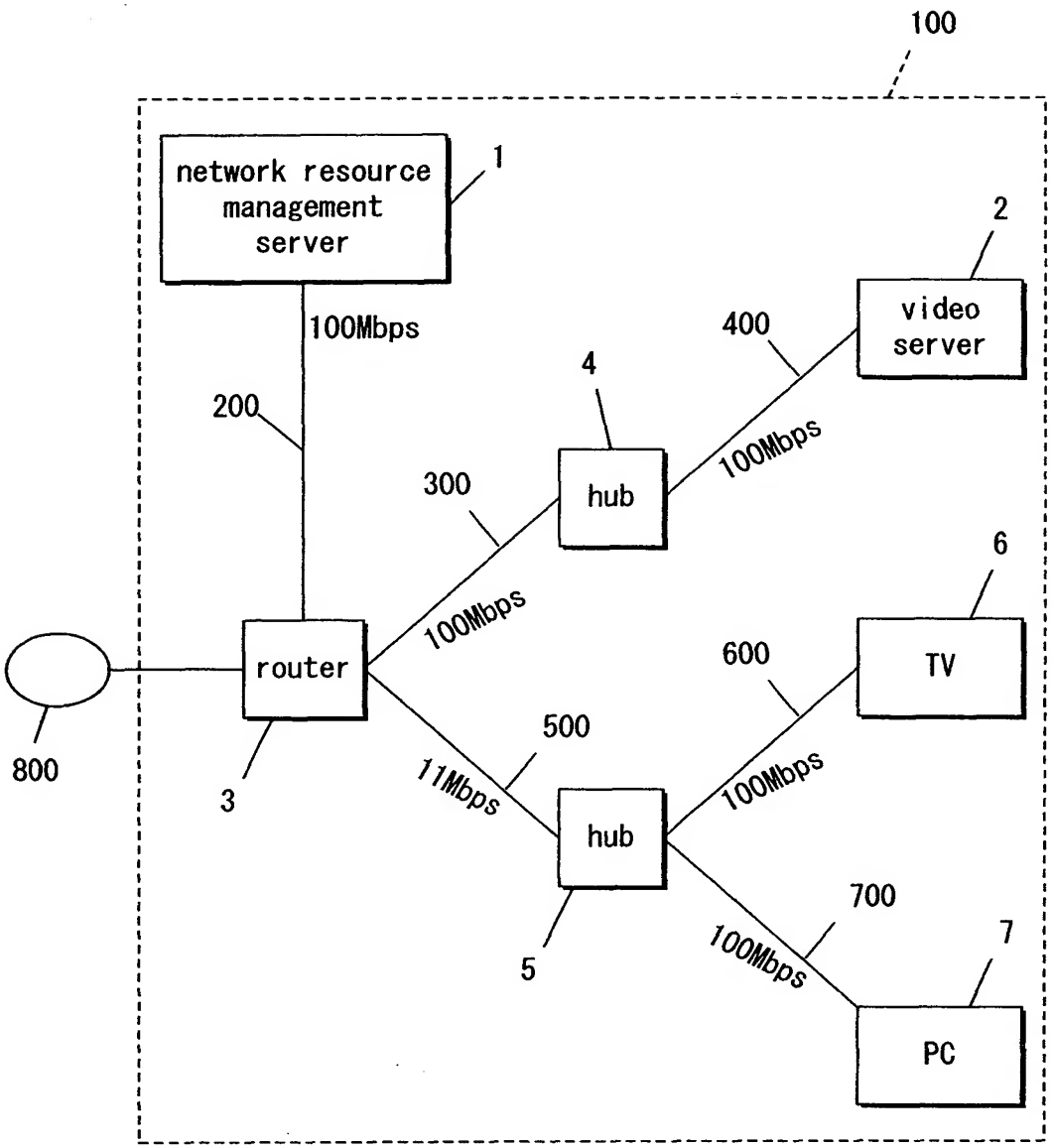

100
network resource management server
1
2
video server
100Mbps
400
4
200
hub
100Mbps
300
6
100Mbps
router
TV
600
500
800
3
11Mbps
100Mbps
hub
700
5
100Mbps
7
PC

Fig. 2

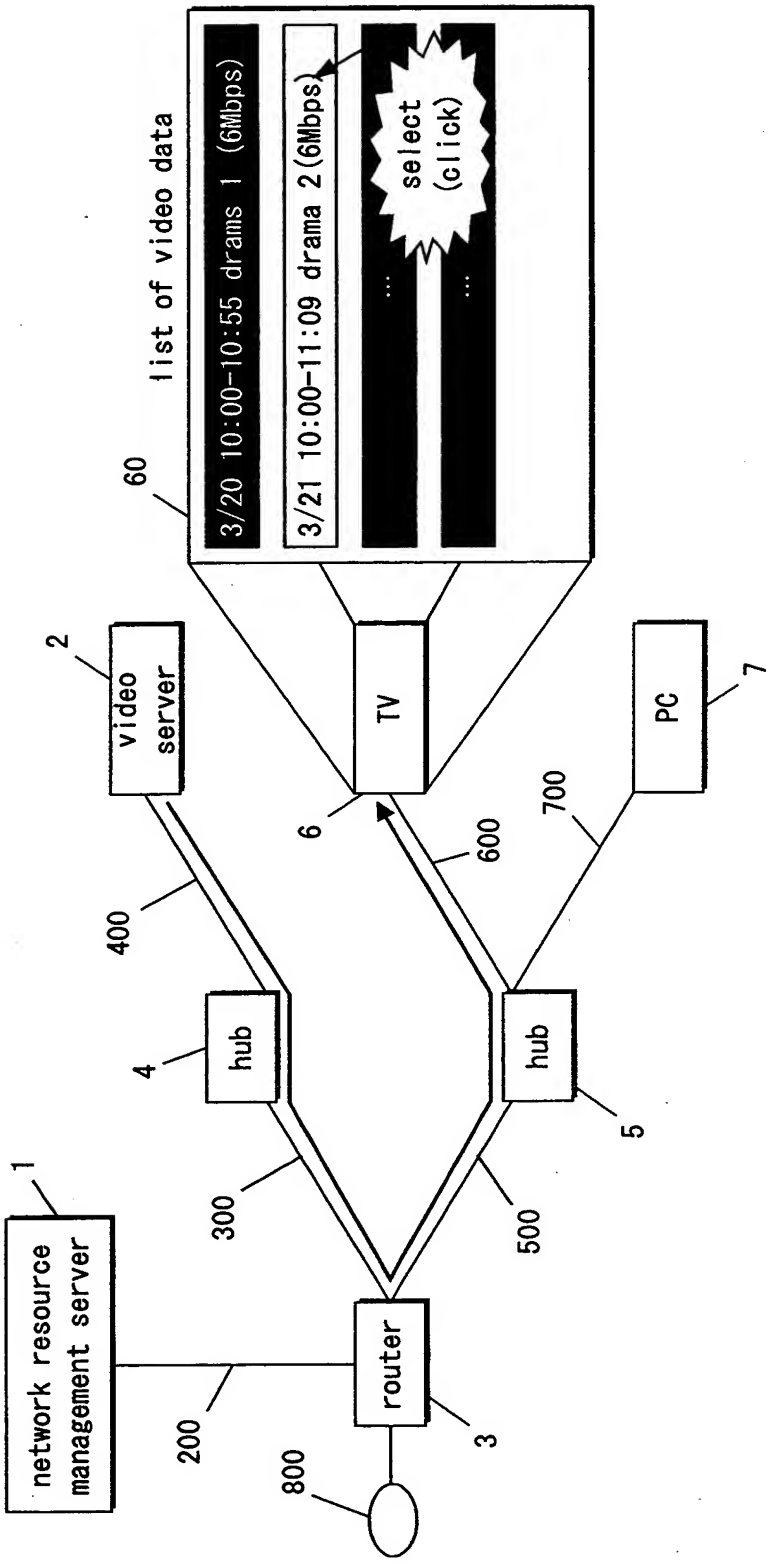

list of video data
3/20 10:00-10:55 drams 1 (6Mbps)
3/21 10:00-11:09 drama 2(6Mbps)
select (click)
60
video server
2
TV
6
PC
7
hub
4
hub
5
network resource management server
1
router
3
200
300
400
500
600
700
800

Fig. 3

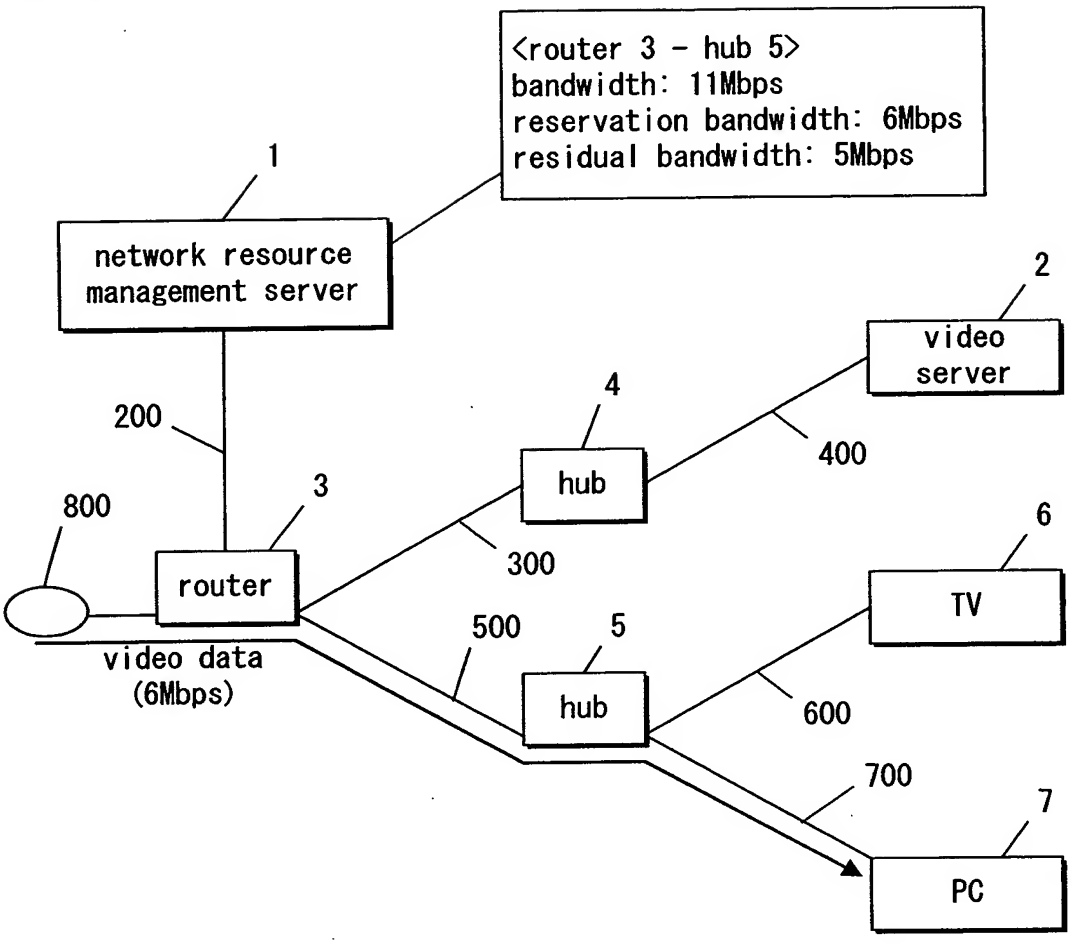

<router 3 - hub 5>
bandwidth: 11Mbps
reservation bandwidth: 6Mbps
residual bandwidth: 5Mbps
1
network resource management server
2
video server
200
4
hub
400
800
3
router
300
6
TV
video data (6Mbps)
500
5
hub
600
700
7
PC

Fig. 4

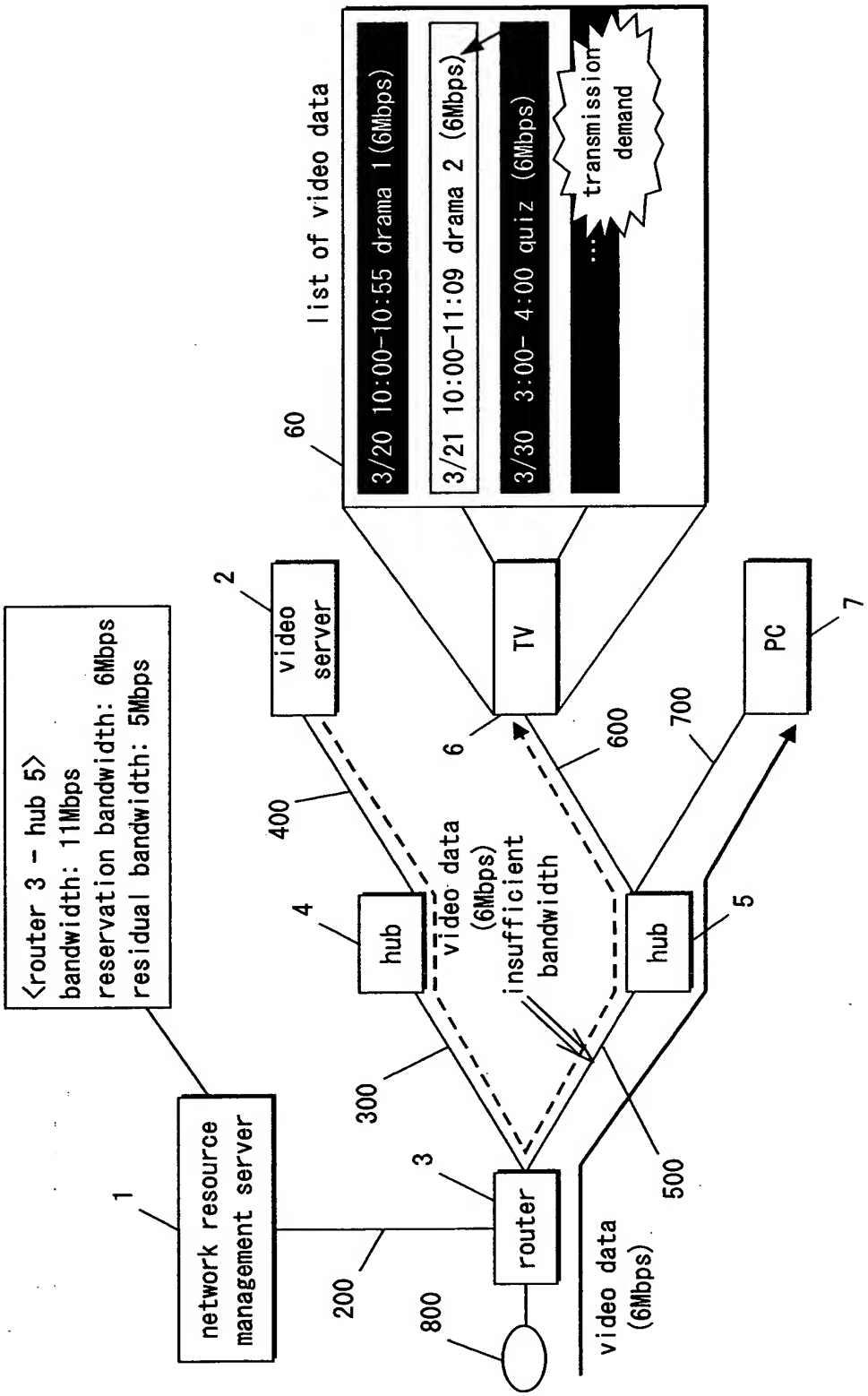

list of video data
3/20 10:00-10:55 drama 1 (6Mbps)
3/21 10:00-11:09 drama 2 (6Mbps)
3/30 3:00- 4:00 quiz (6Mbps)
...
transmission demand
60
video server
2
TV
6
PC
7
<router 3 - hub 5>
bandwidth: 11Mbps
reservation bandwidth: 6Mbps
residual bandwidth: 5Mbps
network resource management server
1
router
3
hub
4
hub
5
400
600
700
300
500
200
800
video data (6Mbps)
insufficient bandwidth
video data (6Mbps)

Fig. 5

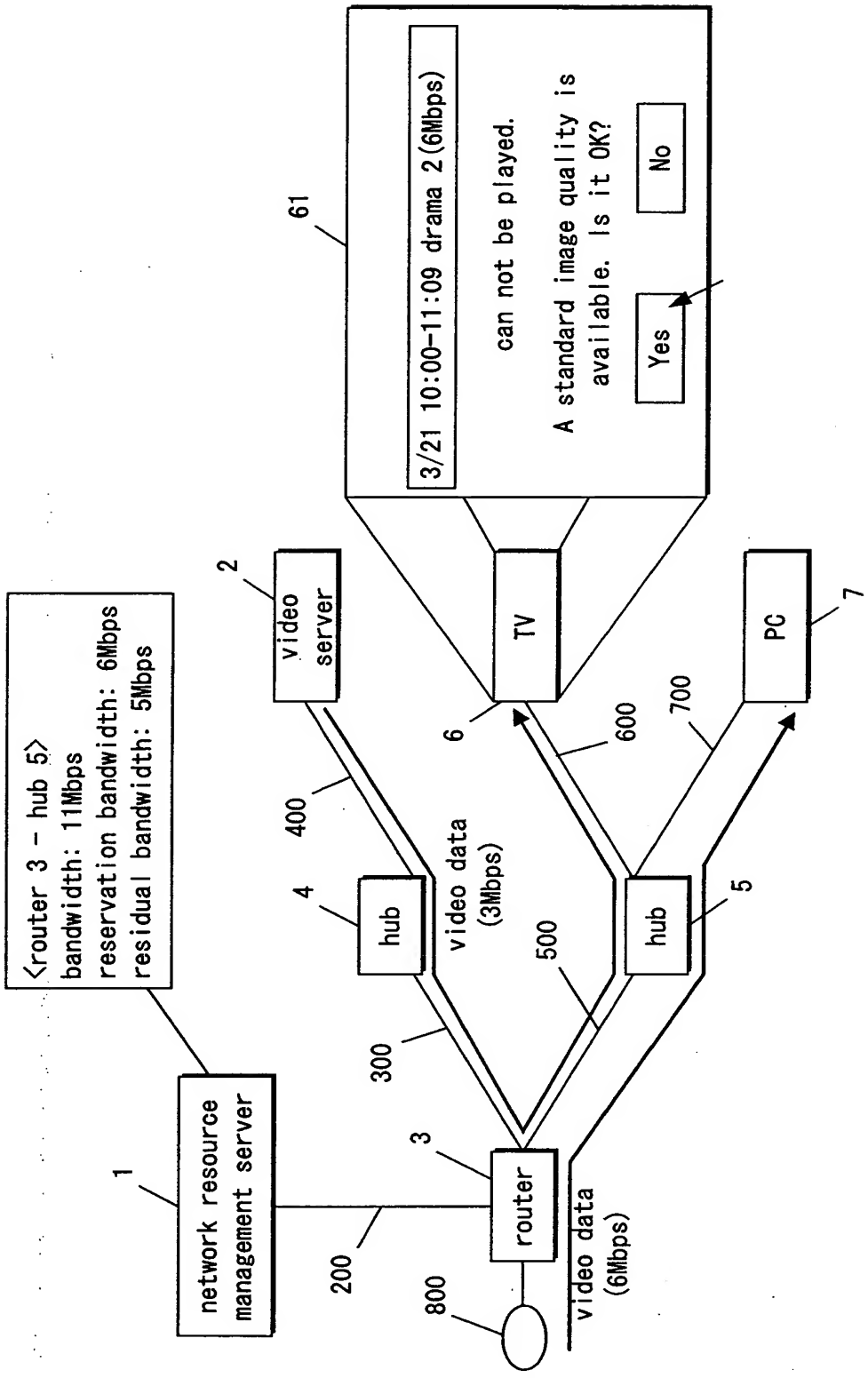
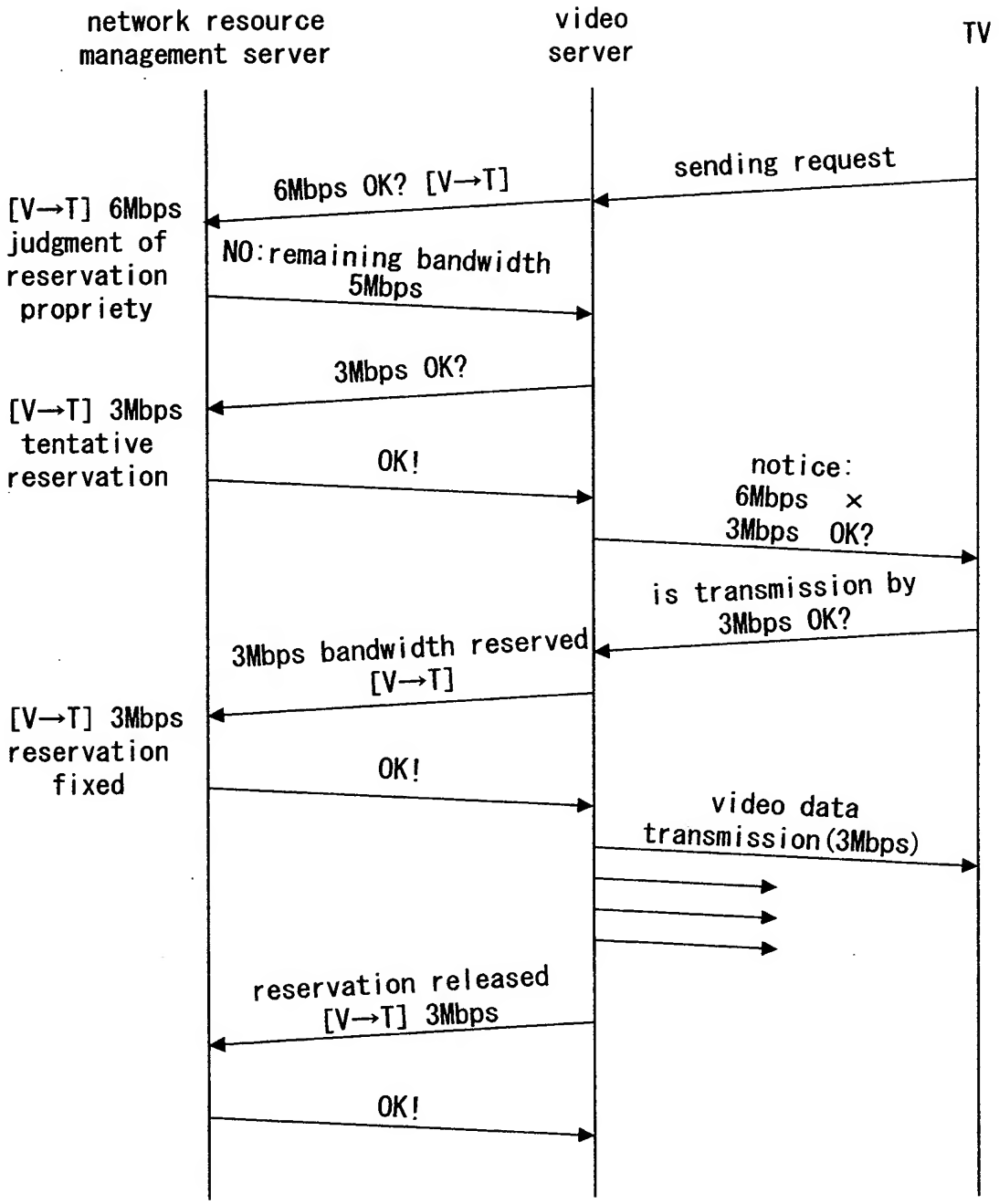

61
3/21 10:00-11:09 drama 2(6Mbps)
can not be played.
A standard image quality is available. Is it OK?
Yes
No
2
video server
TV
PC
7
6
600
700
400
4
hub
video data (3Mbps)
500
hub
5
300
3
router
video data (6Mbps)
800
200
1
network resource management server
<router 3 - hub 5>
bandwidth: 11Mbps
reservation bandwidth: 6Mbps
residual bandwidth: 5Mbps

Fig. 6



V: video server
T: TV

Fig. 7

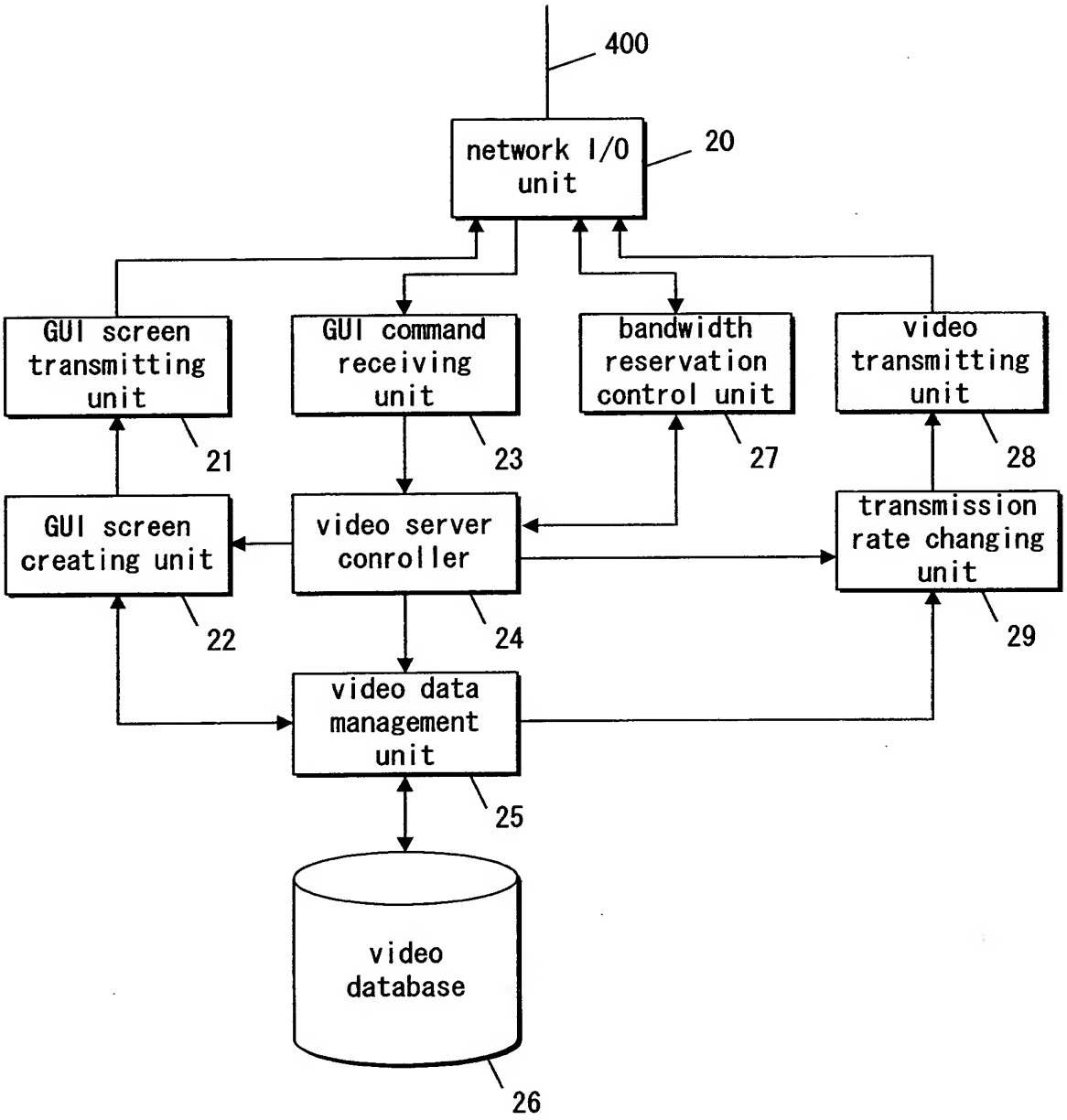

400
network I/O unit
20
GUI screen transmitting unit
21
GUI command receiving unit
23
bandwidth reservation control unit
27
video transmitting unit
28
GUI screen creating unit
22
video server conroller
24
transmission rate changing unit
29
video data management unit
25
video database
26

Fig. 8

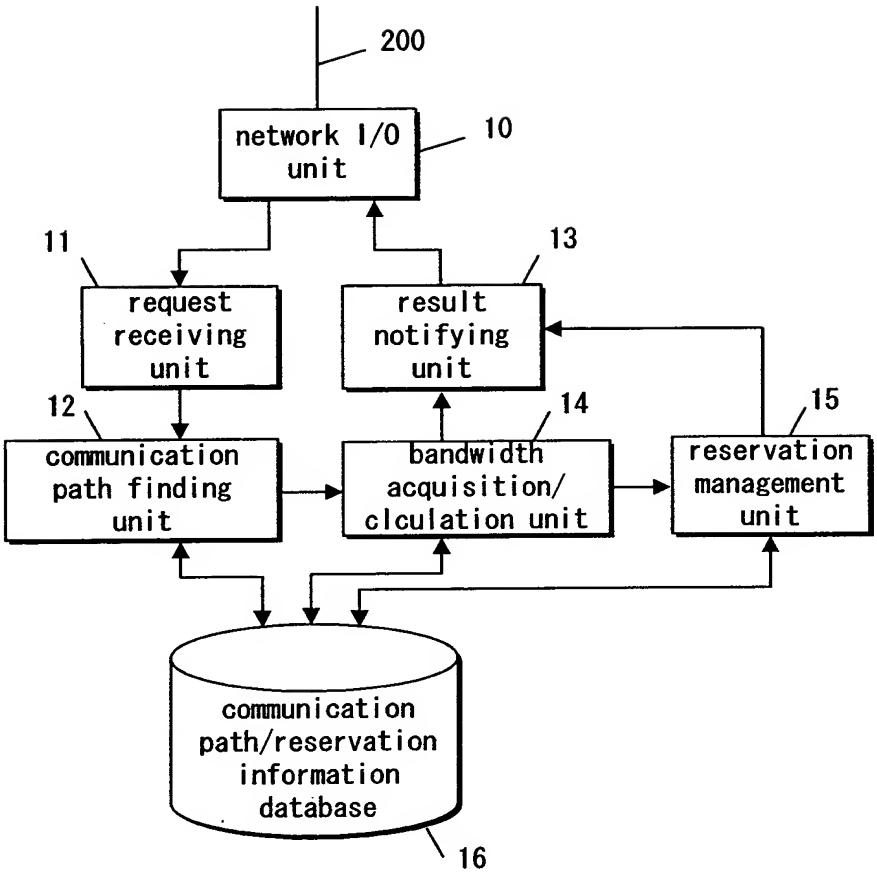
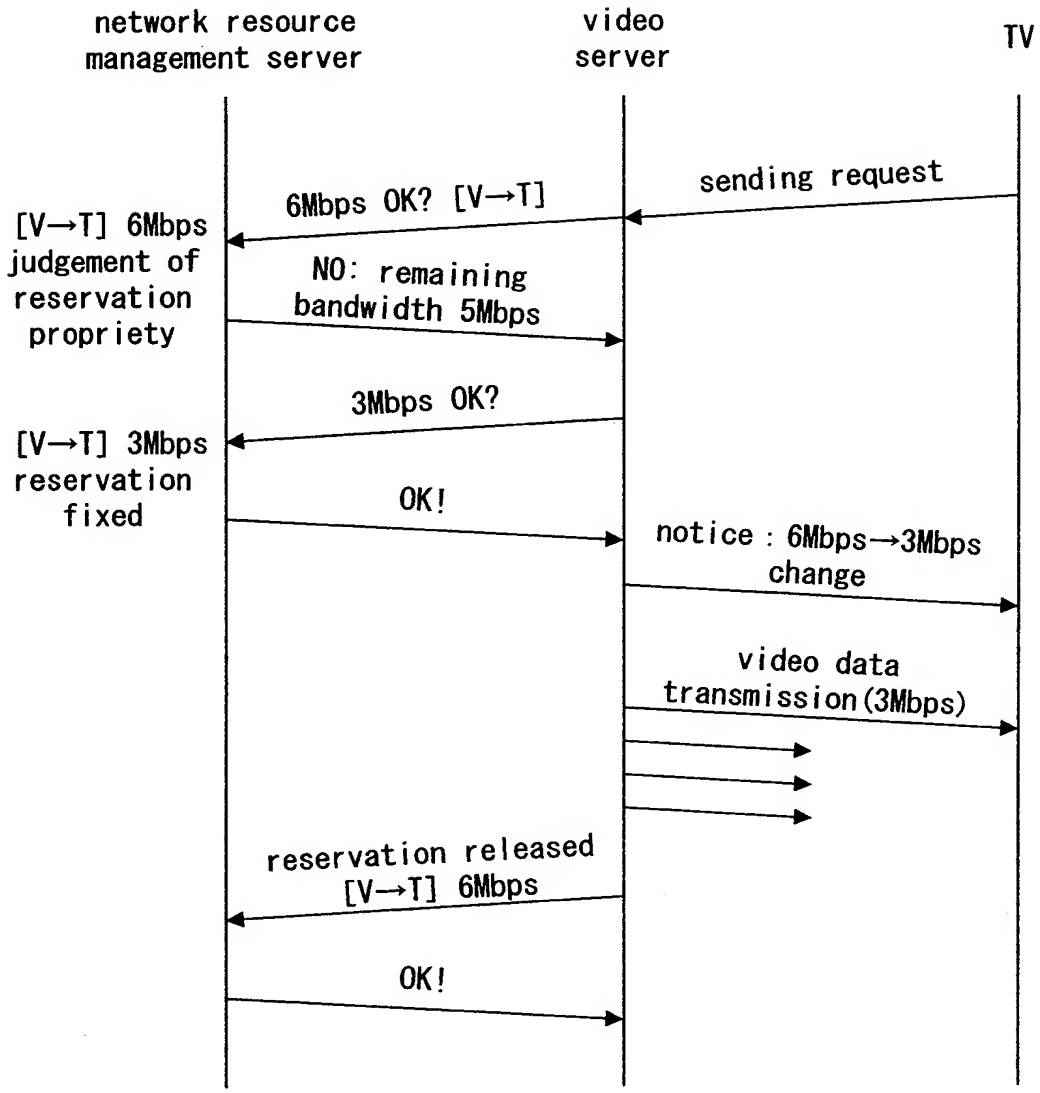


Fig. 9

path			bandwidth	reservation bandwidth	residual bandwidth
video server 2	→	hub 4	100Mbps	0Mbps	100Mbps
hub 4	→	router 3	100Mbps	0Mbps	100Mbps
router 3	→	hub 5	11Mbps	6Mbps	5Mbps
hub 5	→	TV 6	100Mbps	0Mbps	100Mbps
hub 5	→	PC 7	100Mbps	6Mbps	94Mbps

Fig. 10



V: video server
T: TV

Fig. 11

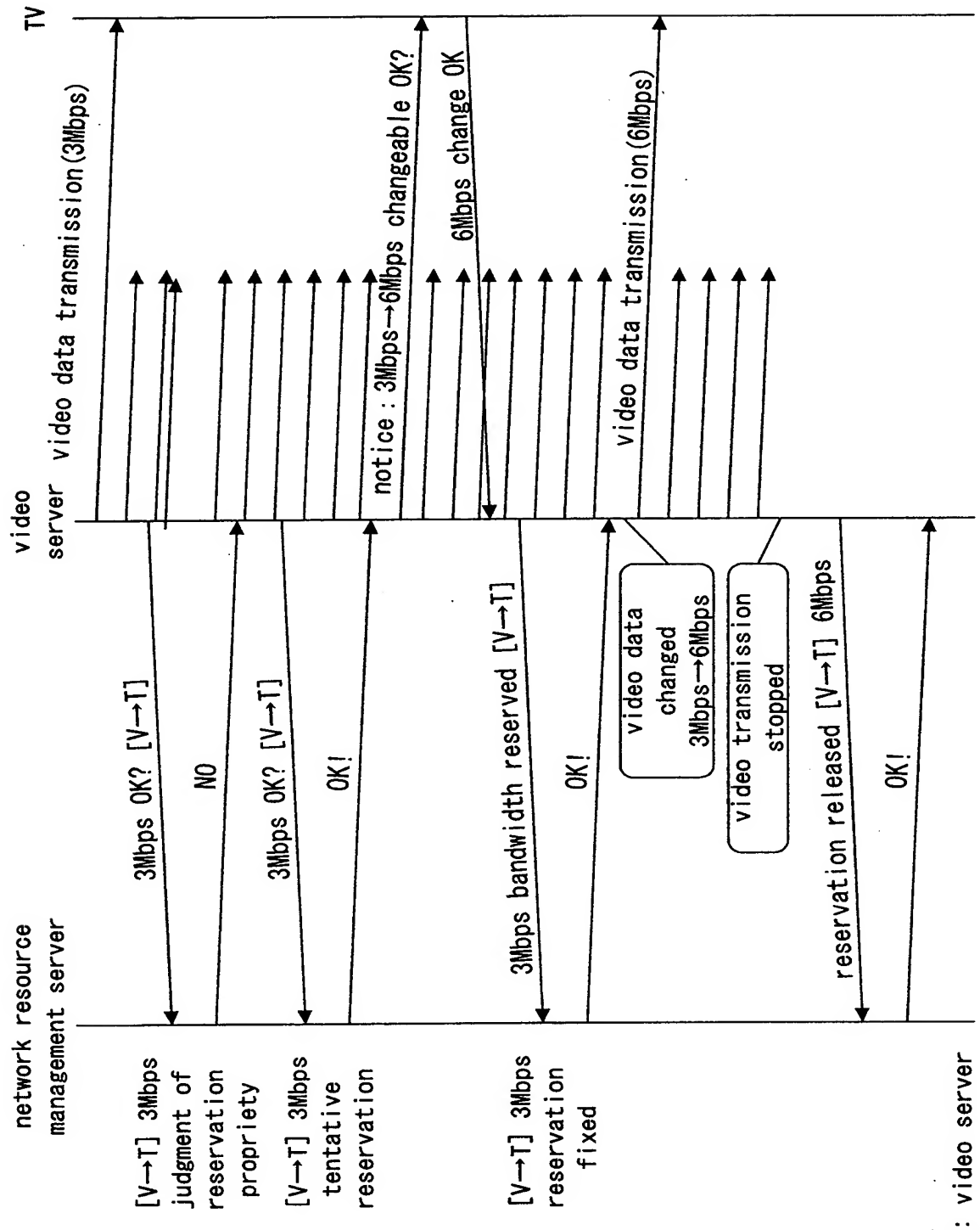
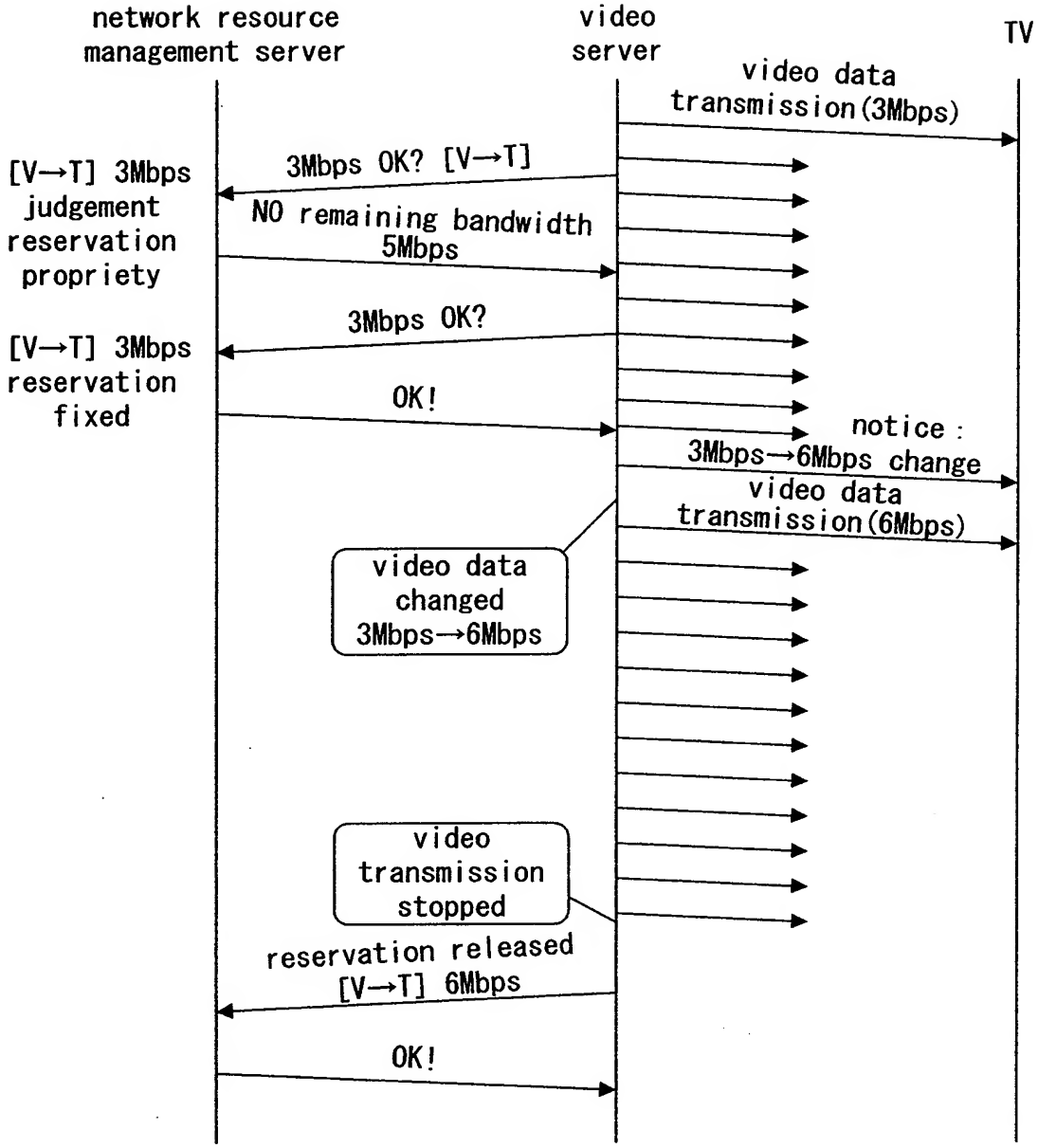

TV
video server
network resource management server
video data transmission(3Mbps)
3Mbps OK? [V→T]
NO
3Mbps OK? [V→T]
OK!
notice : 3Mbps→6Mbps changeable OK?
6Mbps change OK
3Mbps bandwidth reserved [V→T]
OK!
video data transmission(6Mbps)
video data changed 3Mbps→6Mbps
video transmission stopped
reservation released [V→T] 6Mbps
OK!
[V→T] 3Mbps judgment of reservation propriety
[V→T] 3Mbps tentative reservation
[V→T] 3Mbps reservation fixed
V: video server
T: TV

Fig. 12



V: video server
T: TV

Fig. 13

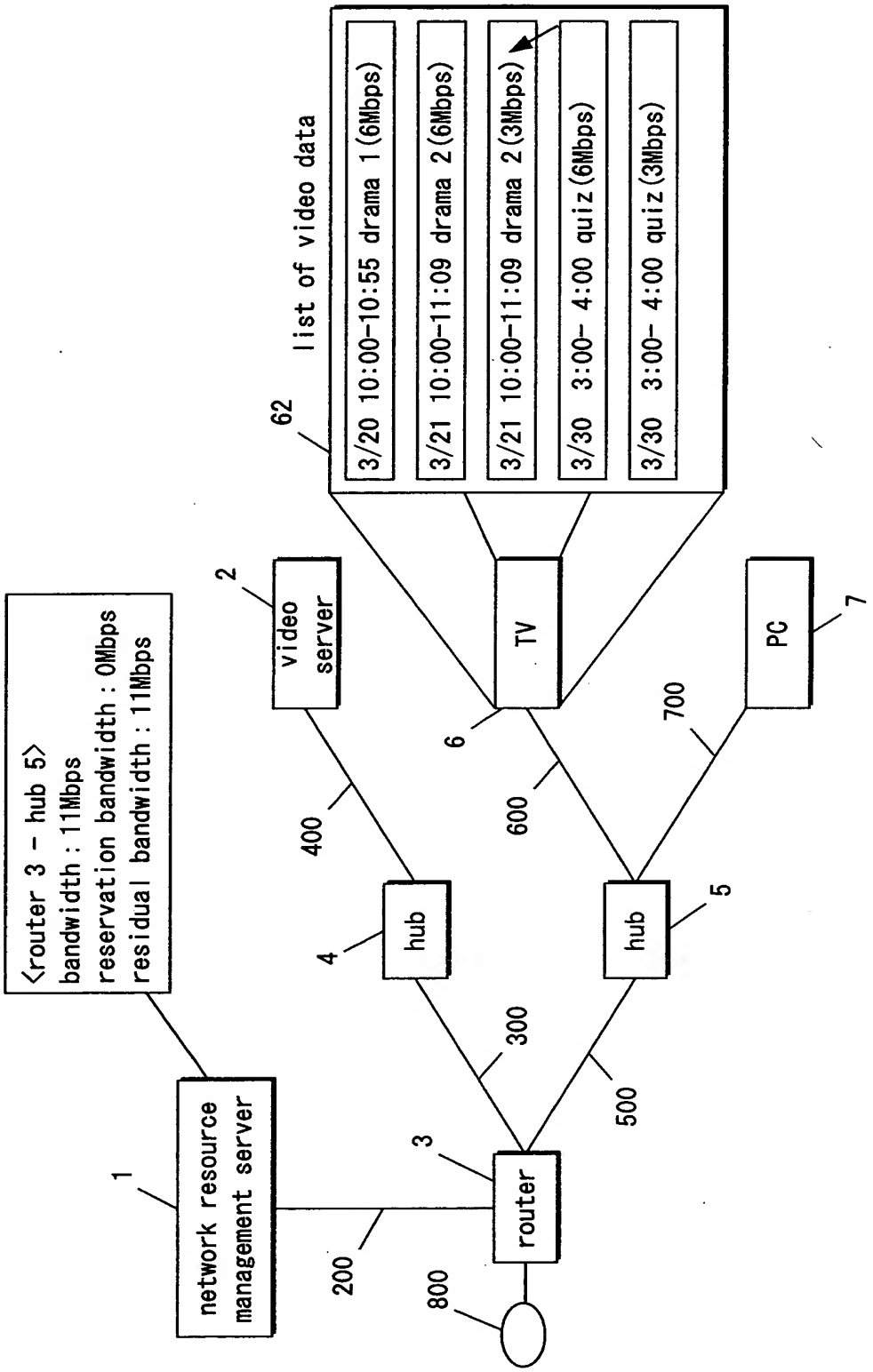

list of video data
3/20 10:00-10:55 drama 1(6Mbps)
3/21 10:00-11:09 drama 2(6Mbps)
3/21 10:00-11:09 drama 2(3Mbps)
3/30 3:00- 4:00 quiz(6Mbps)
3/30 3:00- 4:00 quiz(3Mbps)
62
video server
2
TV
6
PC
7
<router 3 - hub 5>
bandwidth : 11Mbps
reservation bandwidth : 0Mbps
residual bandwidth : 11Mbps
network resource management server
1
router
3
hub
4
hub
5
400
600
700
300
500
200
800

Fig. 14

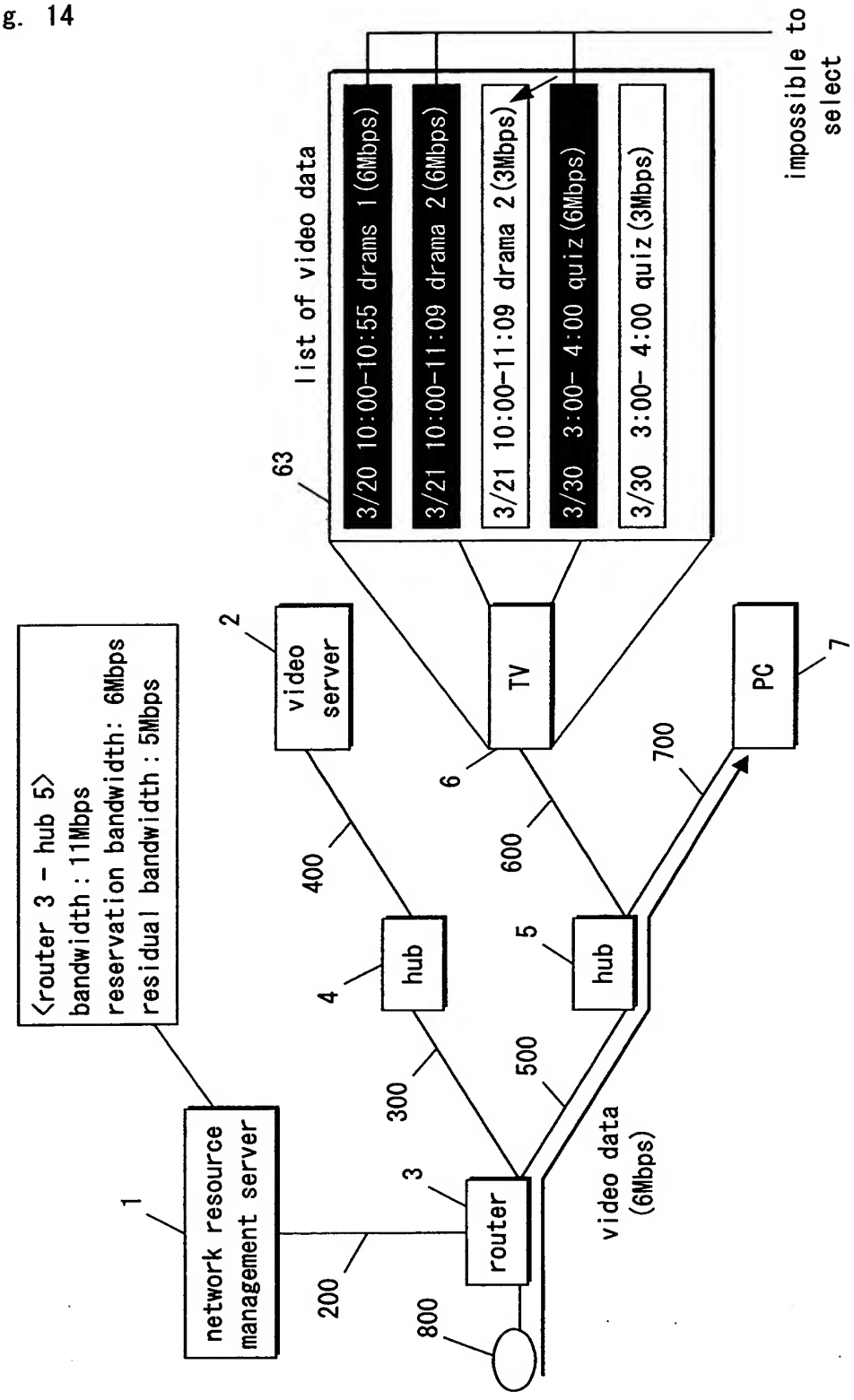

list of video data
3/20 10:00-10:55 drams 1(6Mbps)
3/21 10:00-11:09 drama 2(6Mbps)
3/21 10:00-11:09 drama 2(3Mbps)
3/30 3:00- 4:00 quiz(6Mbps)
3/30 3:00- 4:00 quiz(3Mbps)
impossible to select
63
<router 3 - hub 5>
bandwidth : 11Mbps
reservation bandwidth: 6Mbps
residual bandwidth : 5Mbps
video server
TV
PC
hub
hub
router
network resource management server
video data (6Mbps)
1
2
3
4
5
6
7
200
300
400
500
600
700
800

Fig. 15

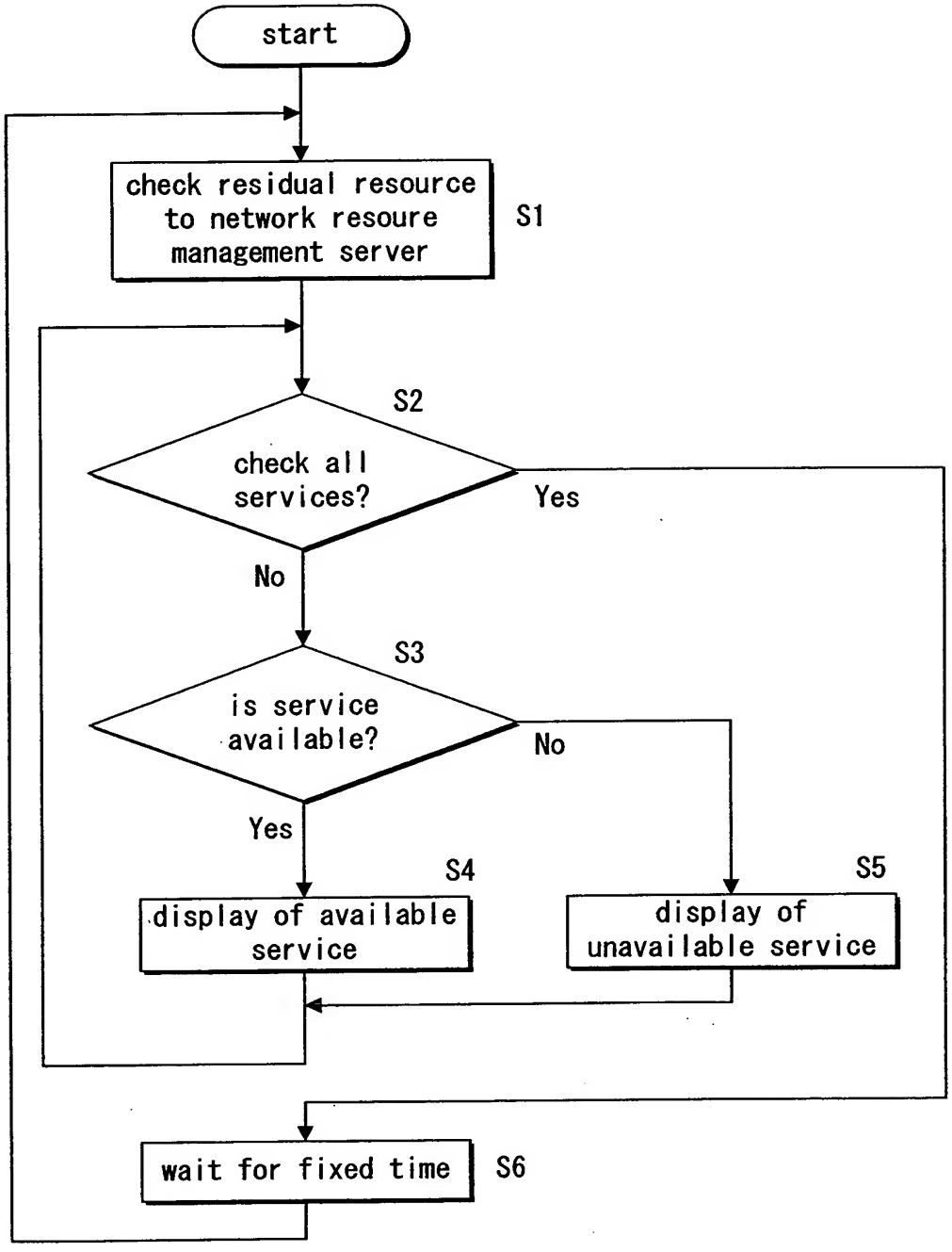

start
check residual resource to network resoure management server
S1
S2
check all services?
Yes
No
S3
is service available?
No
Yes
S4
display of available service
S5
display of unavailable service
wait for fixed time
S6

Fig. 16

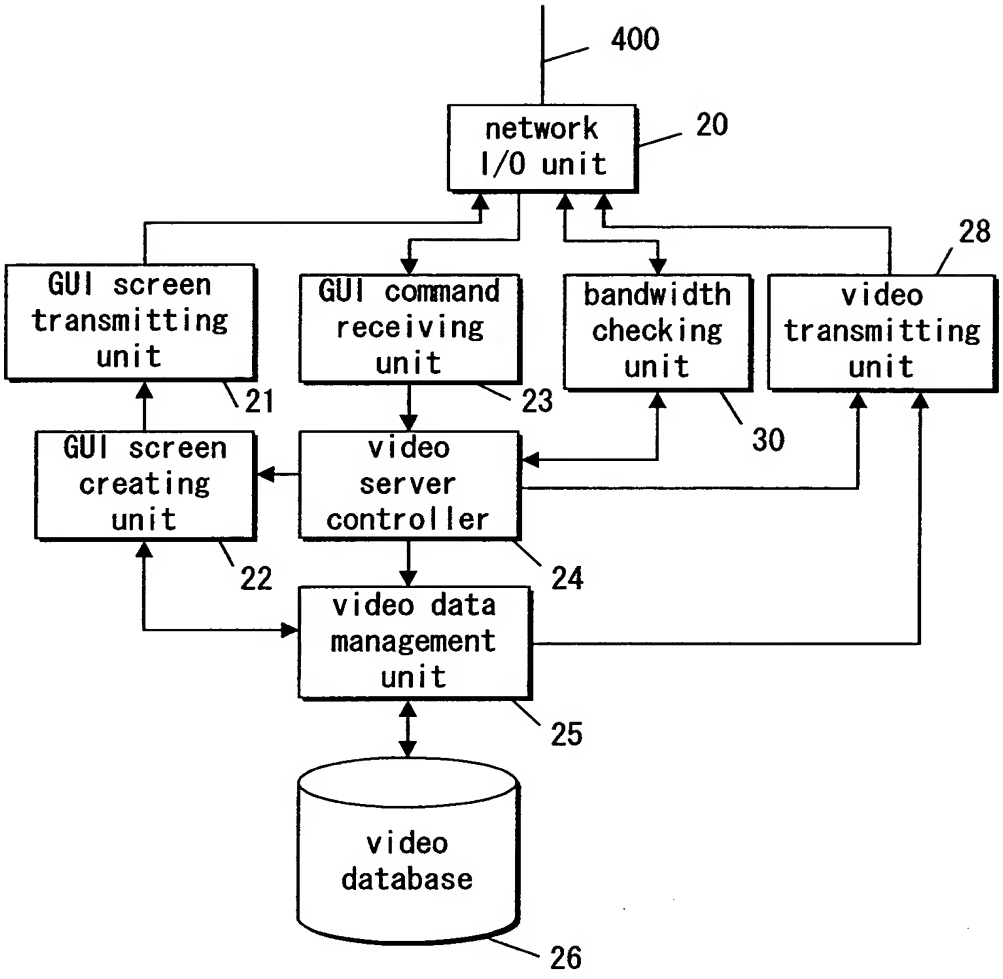
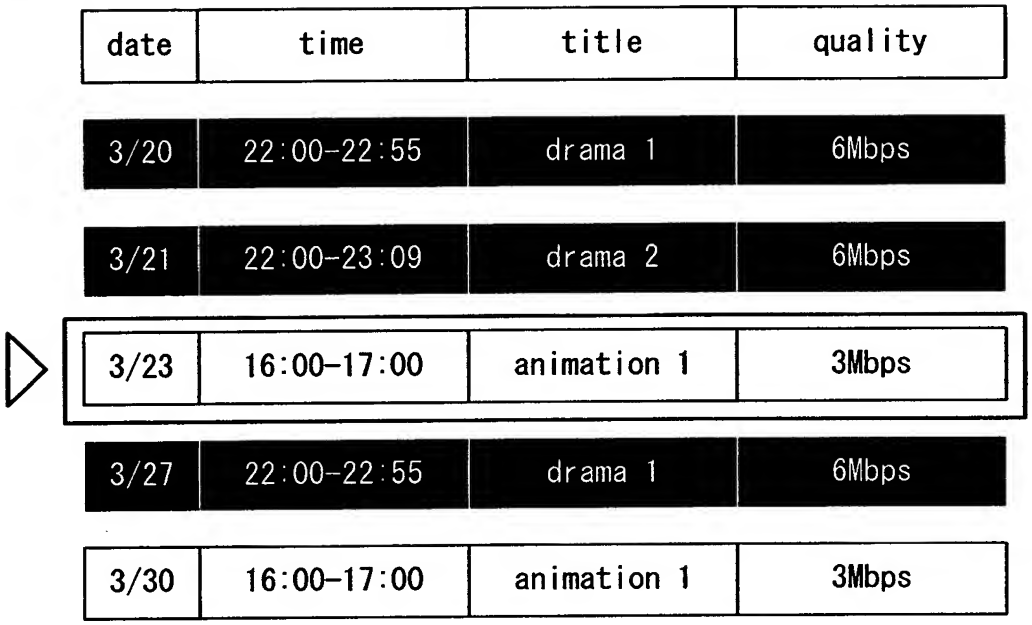
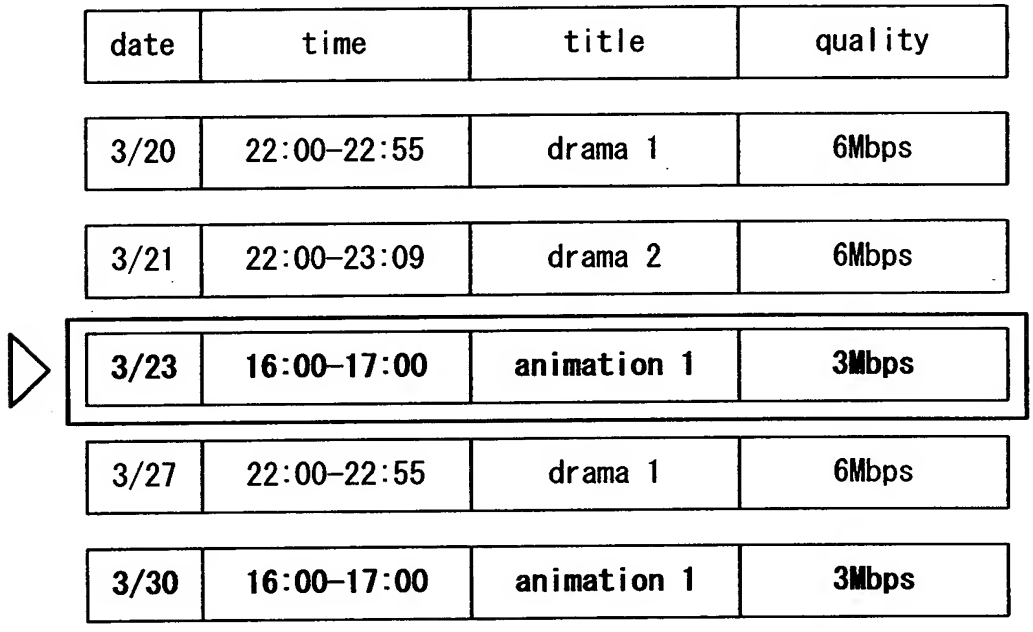

400
network I/O unit
20
28
GUI screen transmitting unit
21
GUI command receiving unit
23
bandwidth checking unit
30
video transmitting unit
GUI screen creating unit
22
video server controller
24
video data management unit
25
video database
26

Fig. 17



date	time	title	quality
3/20	22:00-22:55	drama 1	6Mbps
3/21	22:00-23:09	drama 2	6Mbps
3/23	16:00-17:00	animation 1	3Mbps
3/27	22:00-22:55	drama 1	6Mbps
3/30	16:00-17:00	animation 1	3Mbps

Fig. 18



date	time	title	quality
3/20	22:00-22:55	drama 1	6Mbps
3/21	22:00-23:09	drama 2	6Mbps
3/23	**16:00-17:00**	**animation 1**	**3Mbps**
3/27	22:00-22:55	drama 1	6Mbps
3/30	16:00-17:00	animation 1	3Mbps

Fig. 19

date	time	title	quality
~~3/20~~	~~22:00-22:55~~	~~drama 1~~	~~6Mbps~~
~~3/21~~	~~22:00-23:09~~	~~drama 2~~	~~6Mbps~~
3/23	16:00-17:00	animation 1	3Mbps
~~3/27~~	~~22:00-22:55~~	~~drama 1~~	~~6Mbps~~
3/30	16:00-17:00	animation 1	3Mbps

Fig. 20

date	time	title	quality
3/23	16:00-17:00	amination 1	3Mbps
3/30	16:00-17:00	animation 1	3Mbps

Fig. 21

date	time	title	quality
3/23	16:00-17:00	animation 1	3Mbps
3/30	16:00-17:00	animation 1	3Mbps
3/20	22:00-22:55	drama 1	6Mbps
3/21	22:00-23:09	drama 2	6Mbps
3/27	22:00-22:55	drama 1	6Mbps

Fig. 22

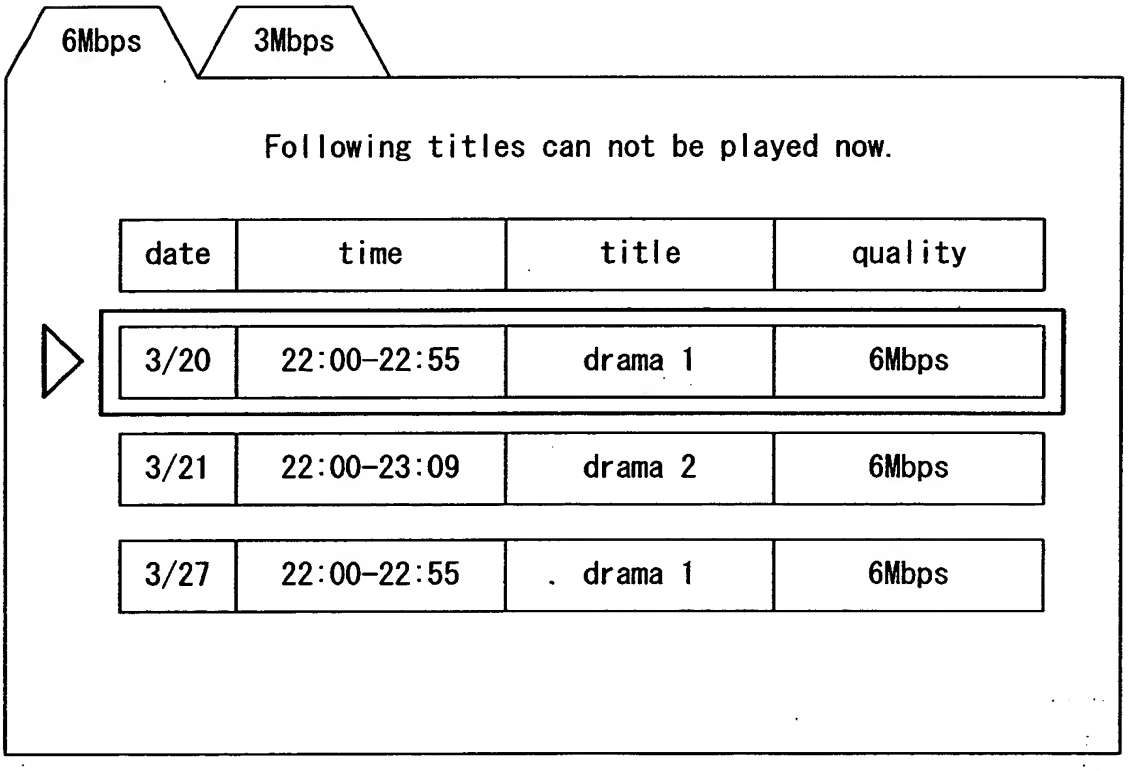


Fig. 23

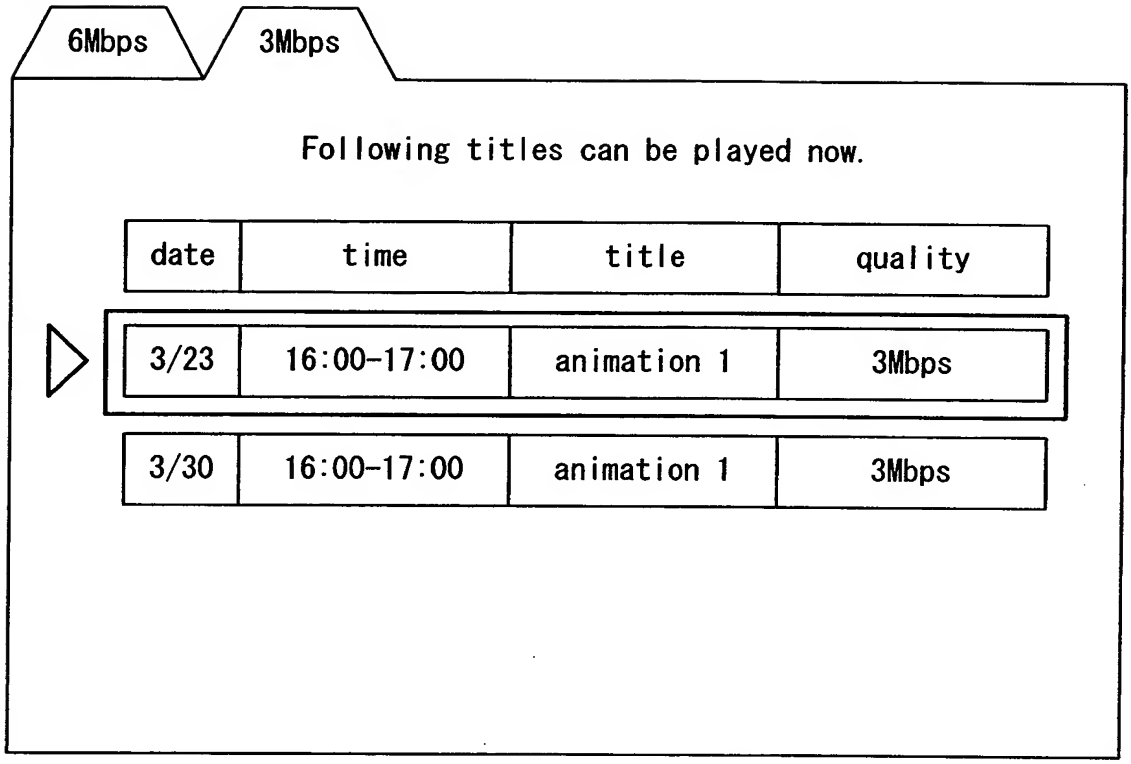

6Mbps
3Mbps
Following titles can be played now.
date
time
title
quality
3/23
16:00-17:00
animation 1
3Mbps
3/30
16:00-17:00
animation 1
3Mbps

Fig. 24

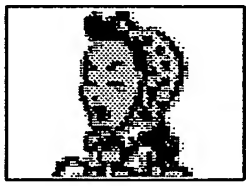
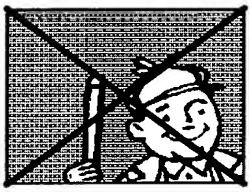
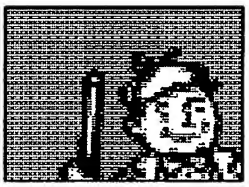
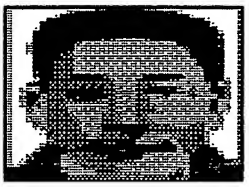
date	time	title	preview
3/20	22:00-22:55	drama 1	
3/21	22:00-23:09	drama 2	
3/23	16:00-17:00	animation 1	 
3/27	22:00-22:55	drama 1	

Fig. 25

date	time	title	quality
3/20	22:00-22:55	drama 1	6Mbps
3/21	22:00-23:09	drama 2	6Mbps
3/23	16:00-17:00	animation 1	3Mbps
3/27	22:00-22:55	drama 1	6Mbps
3/30	16:00-17:00	animation 1	3Mbps

6Mbps service can not be provided by the shortage of bands

Fig. 26

date	time	title	quality
3/20	22:00-22:55	drama 1	6Mbps
3/21	22:00-23:09	drama 2	6Mbps
3/23	16:00-17:00	animation 1	3Mbps
3/27	22:00-22:55	drama 1	6Mbps
3/30	16:00-17:00	animation 1	3Mbps

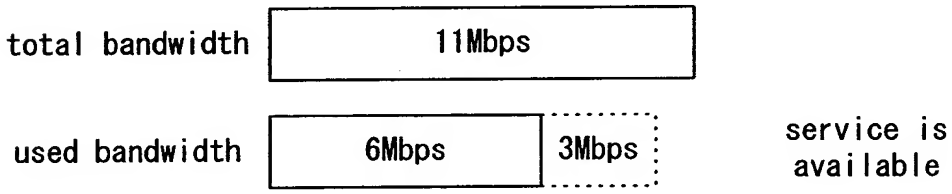


Fig. 27

date	time	title	quality
3/20	22:00-22:55	drama 1	6Mbps
3/21	22:00-23:09	drama 2	6Mbps
3/23	16:00-17:00	animation 1	3Mbps
3/27	22:00-22:55	drama 1	6Mbps
3/30	16:00-17:00	animation 1	3Mbps

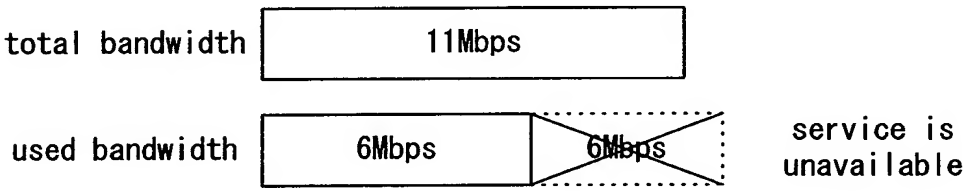


Fig. 28

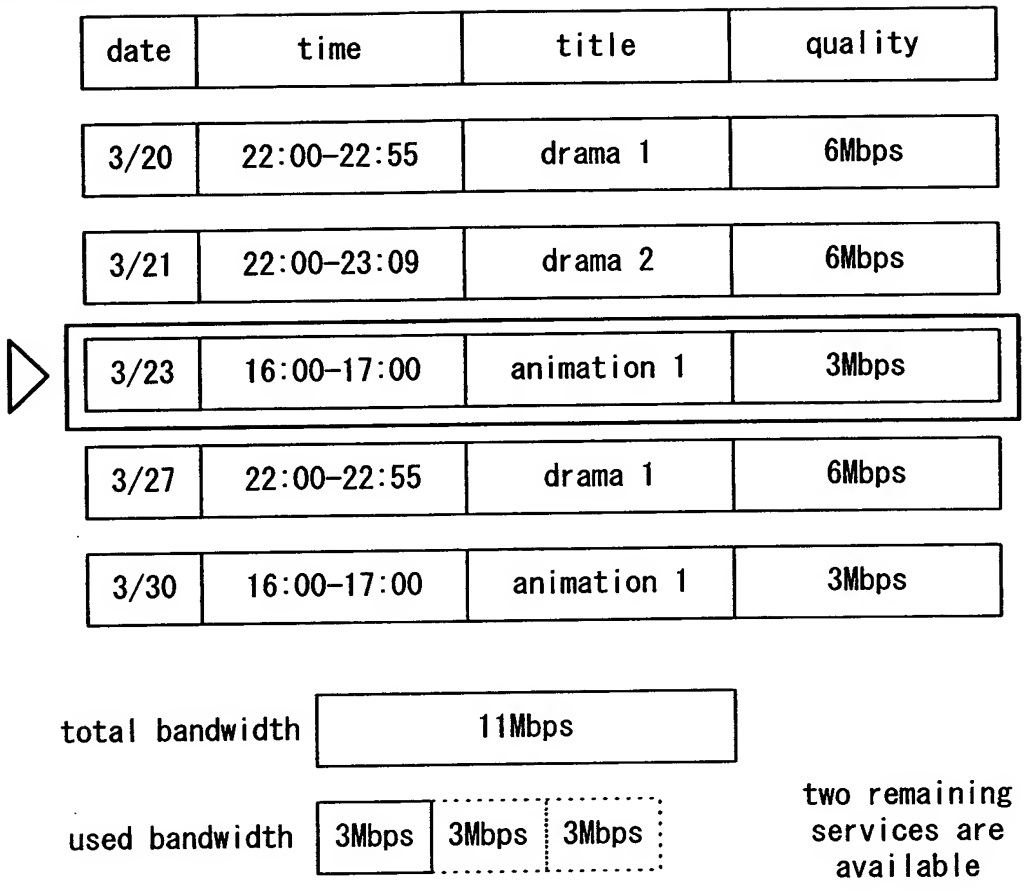

date
time
title
quality
3/20
22:00-22:55
drama 1
6Mbps
3/21
22:00-23:09
drama 2
6Mbps
3/23
16:00-17:00
animation 1
3Mbps
3/27
22:00-22:55
drama 1
6Mbps
3/30
16:00-17:00
animation 1
3Mbps
total bandwidth
11Mbps
used bandwidth
3Mbps
3Mbps
3Mbps
two remaining services are available

Fig. 29

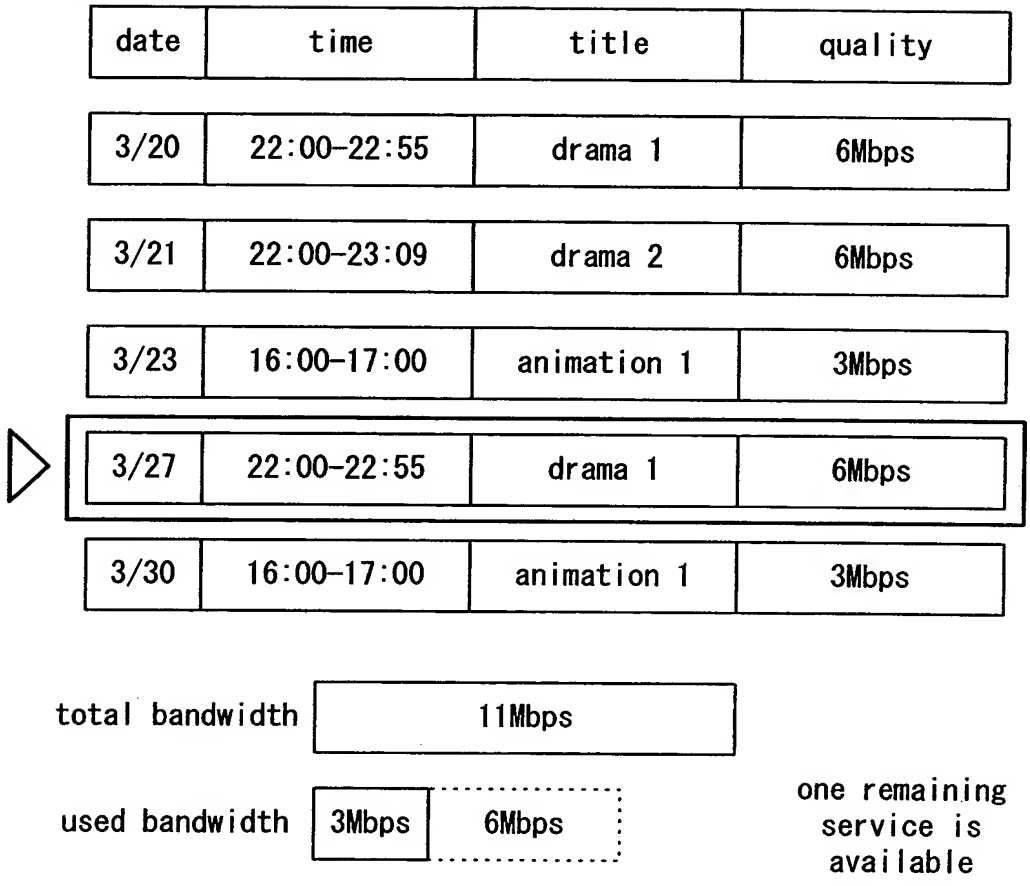
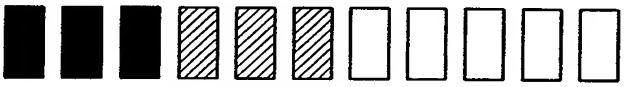

date
time
title
quality
3/20
22:00-22:55
drama 1
6Mbps
3/21
22:00-23:09
drama 2
6Mbps
3/23
16:00-17:00
animation 1
3Mbps
3/27
22:00-22:55
drama 1
6Mbps
3/30
16:00-17:00
animation 1
3Mbps
total bandwidth
11Mbps
used bandwidth
3Mbps
6Mbps
one remaining service is available

Fig. 30

date	time	title	quality
3/20	22:00-22:55	drama 1	6Mbps
3/21	22:00-23:09	drama 2	6Mbps
3/23	16:00-17:00	animation 1	3Mbps
3/27	22:00-22:55	drama 1	6Mbps
3/30	16:00-17:00	animation 1	3Mbps

state of used bandwidth	3Mbps	3Mbps	

Fig. 31

date	time	title	quality
3/20	22:00-22:55	drama 1	6Mbps
3/21	22:00-23:09	drama 2	6Mbps
3/23	16:00-17:00	animation 1	3Mbps
3/27	22:00-22:55	drama 1	6Mbps
3/30	16:00-17:00	animation 1	3Mbps

state of used bandwidth 3/11Mbps